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10CFR50.73

September 18, 2002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 2
Facility Operating License Nos. NPF-85
NRC Docket Nos. 50-353

Subject: LER 2-02-001, Unit 2 Scram due to Degraded Main Condenser Vacuum

This Licensee Event Report (LER) addresses a Unit 2 unplanned manual scram due to a degraded main condenser vacuum condition as a result of a failure of the air removal system.

Report Number:	2-02-001
Revision:	00
Event Date:	July 23, 2002
Discovered Date:	July 23, 2002
Report Date:	September 18, 2002

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

William Levis
Vice President - Limerick

cc: H. J. Miller, Administrator Region I, USNRC
A. L. Burritt, USNRC Senior Resident Inspector, LGS

IE22

NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

Estimated burden per response to comply with this mandatory information collection request 50 hours Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U S Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503 If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Limerick Generating Station, Unit 2	05000 353	1 OF 3

TITLE (4)

Manual Scram due to Failure of Main Condenser Air Removal System

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
7	23	2002	2002	001	00	9	18	2002	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)

	20 2201(b)		20 2203(a)(3)(ii)		50 73(a)(2)(ii)(B)		50 73(a)(2)(ix)(A)
	20 2201(d)		20 2203(a)(4)		50 73(a)(2)(iii)		50 73(a)(2)(x)
	20 2203(a)(1)		50 36(c)(1)(i)(A)	x	50 73(a)(2)(iv)(A)		73 71(a)(4)
	20 2203(a)(2)(i)		50 36(c)(1)(ii)(A)		50 73(a)(2)(v)(A)		73 71(a)(5)
	20 2203(a)(2)(ii)		50 36(c)(2)		50 73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20 2203(a)(2)(iii)		50 46(a)(3)(ii)		50 73(a)(2)(v)(C)		
	20 2203(a)(2)(iv)		50 73(a)(2)(i)(A)		50 73(a)(2)(v)(D)		
	20 2203(a)(2)(v)		50 73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20 2203(a)(2)(vi)		50 73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20 2203(a)(3)(i)		50 73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
M. C. Kaminski, Manager – Regulatory Assurance	(610) 718-3400

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
A	SH	COND	F175	Y					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, I e., approximately 15 single-spaced typewritten lines) (16)

Limerick Unit 2 was manually scrammed due to degraded main condenser vacuum. The condenser air removal system failed due to temperature in the steam jet air ejector (SJAE) condenser exceeding the design limit. The design limitations of the steam jet air ejector system were not properly addressed during the turbine retrofit project resulting in plant operating procedures allowing these limitations to be exceeded. Operating procedures for both units were revised to require a power reduction prior to condensate temperature or condenser backpressure exceeding established limits that maintain sufficient margin to ensure proper operation of the air removal system.

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Limerick Generating Station, Unit 2	05000353	2002	– 001	– 00	2 OF 3

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

Unit Conditions Prior to the Event

Unit 2 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On July 23, 2002, at 16:13 hours, the Unit 2 high-pressure main condenser (EIIS:COND) vacuum decreased to 23.4 inches Hg causing a main control room (MCR) alarm ; the procedure for loss of vacuum was entered. A power reduction was initiated as directed by the procedure. At 16:28 hours, the main turbine backpressure entered the limited operation region. Offgas system (EIIS:WF) flow decreased from a normal value of 13.4 scfm to 4 scfm during the period of decreasing vacuum indicating a malfunction of the air removal system (EIIS:SH).

At 16:32 hours, a manual scram was performed in accordance with the procedure for rapid plant shutdown; main condenser vacuum was at approximately 23 inches Hg and decreasing. All control rods inserted as designed.

Reactor pressure peaked at approximately 1042 psig and was controlled by the main turbine bypass valves (BPV). The lowest main steam relief valve (MSRV) setpoint of 1170 psig was not exceeded; therefore, no actuation of MSRVs occurred.

Reactor narrow range level dropped to approximately -12 inches as expected resulting in Group 2A and 2B residual heat removal (RHR) isolations that occurred as designed at +12.5 inches. Reactor level subsequently increased to approximately +60 inches resulting in a high-level trip of the reactor feed pumps (RFP) and High Pressure Coolant Injection (HPCI) system at +54 inches. The Main Turbine also received a high-level trip signal but had been previously manually tripped by the reactor operator. The 2A RFP was reset and used to control reactor level. The high level trip was due to RFP discharge pressure being greater than reactor pressure vessel (RPV) pressure when the RFPs were operating at minimum speed. Operating procedures have been revised to address this condition.

This event involved a valid manual actuation of the reactor protection system (RPS) system when the reactor was critical. The 4-hour ENS notification required by 10CFR50.72(b)(2)(iv)(B) and the 8-hour ENS notification required by 10CFR50.72(b)(3)(iv)(A) was completed on July 23, 2002 at 17:30 hours (Event# 39085).

This event involved a manual actuation of the reactor protection system. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

Analysis of the Event

There were no actual safety consequences associated with this event. The potential safety consequences of this event were also minimal. The degrading main condenser vacuum resulted in a manual main turbine trip and manual reactor scram. Reactor critical parameters were monitored and controlled by Operations.

Main turbine retrofit projects were completed on Unit 1 in 1998 and on Unit 2 in 1999. The new turbines are able to function at higher backpressures, thus higher condensate temperatures would also be expected. Post event analysis indicated that the higher condensate temperatures were not properly evaluated for effects on the condenser air removal system at the time of the retrofit. Because of this, plant operating limits allowed SJAE (EIIS:EJR) system temperatures to exceed design limitations.

On the day of the transient outside air temperature increased to 95 deg F with very high humidity in the late afternoon. The high ambient temperature caused an increase in main condenser backpressure that resulted in higher than normal condensate temperature. The elevated condensate temperature caused insufficient cooling in the SJAE inter-condenser resulting in a "stalling" condition on the first stage SJAE. This stall condition caused a drop in condenser off-gas flow and further increased the main condenser backpressure. As non-condensables accumulated in the main condenser, the tube bundles became "air blanketed" reducing overall heat transfer, increasing backpressure, and rapidly increasing condensate temperature. The reactor power reduction performed was not effective in recovering condenser vacuum.

Cause of the Event

The cause of the event is that the impact of elevated condensate temperatures on the design limitations of the condenser air removal system was not addressed during the turbine retrofit project and was not adequately documented in plant design documents. Because the effect of condensate temperatures on SJAE performance was not fully realized, changes to plant-operating limits were implemented based solely on condensate demineralizer resin considerations. This allowed full power operation to continue at temperatures exceeding SJAE system design limits.

Corrective Action Completed

Operating procedures and basis documents have been revised to reflect the proper operating conditions for SJAE condenser temperature and condenser backpressure.

Previous Similar Occurrences

There were no previous occurrences of degraded condenser capacity that resulted in unit shutdown.

Component: Cond (Steam Jet Air Ejector Condenser)
Manufacturer: F175 (Foster Wheeler Corp)
Model: 261-KA